

Quinolone Resistance of *E. coli* from Chicken Specimens, 1981-2000

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Background: Fluoroquinolones, e.g., enrofloxacin and ciprofloxacin, are important therapeutic agents in animal and human medicine. In 1996, enrofloxacin was approved for control of chicken mortality associated with *Escherichia coli*. Ciprofloxacin (CI) is a broad-spectrum antimicrobial used to treat infections of humans. Nalidixic acid (NA) is a quinolone commonly used for antimicrobial susceptibility testing. This study investigates the resistance to quinolones in *E. coli* isolated from chickens before and after the approval of enrofloxacin in poultry.

Methods: *E. coli* were submitted for diagnostic purposes to a veterinary reference laboratory from chickens in California, Arkansas, Alabama, North Carolina and Pennsylvania, from 1981 to 2000 inclusive. One hundred of these *E. coli* were randomly selected for antimicrobial susceptibility testing. Cultures were tested for NA and CI resistance by Etest. NA-resistant cultures were further characterized by sequencing of *gyrA*, *gyrB*, *parC* and *parE* quinolone resistance determining regions (QRDRs). Antimicrobial resistance was defined at ≥ 32 $\mu\text{g/ml}$ for NA and ≥ 4 $\mu\text{g/ml}$ for CI.

Results: From 1981 to 1995, 0% (0/74) of isolates grew confluent with MICs ≥ 256 $\mu\text{g/ml}$ NA. Isolated colonies with MICs > 256 $\mu\text{g/ml}$ NA were observed for 3% (2/74) of isolates during this period. All cultures from 1981 to 1995 had MICs ≤ 0.032 $\mu\text{g/ml}$ CI. From 1996 to 2000, 23% (6/26) of cultures grew confluent with MICs > 256 $\mu\text{g/ml}$ NA. An additional 8% (2/26) had isolated colonies with MICs > 256 $\mu\text{g/ml}$ NA. The 6 cultures with confluent growth at > 256 $\mu\text{g/ml}$ NA had MICs of 0.125 to 0.75 $\mu\text{g/ml}$ CI. Point mutations were observed in the QRDR of *gyrA*. All other cultures had CI MICs ≤ 0.032 $\mu\text{g/ml}$. Conclusion: Resistance to NA of *E. coli* cultured from chicken clinical specimens after the approval of enrofloxacin for use in poultry was more frequent than those isolated prior to approval ($P < 0.001$). NA-resistant cultures also displayed decreased susceptibility to ciprofloxacin.